

YEAR 1910

Five storms were found to have occurred in 1910. Tracks for these storms are presented in Fig. 2.

Storm 1, 1910 (Aug. 23-29), T. S.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Aug. 20, Barbados, E. f. 2, 29.96; Grenada, calm, 30.00; Trinidad, W. f. 1, 29.96, rain; ship near 10 N., 59.3 W., E.S.E. f. 2, 29.94; no center drawn, the W. f. 1 at Trinidad was not enough evidence of a closed circulation. Aug. 21, Trinidad, S. f. 2, 29.90; ship near 13 N., 65 W., E.S.E. f. 3, 29.88; no westerly wind. Aug. 22, ship near 15 N., 79 W., E.N.E. f. 3, 29.91; ship near 16 N., 69 W., E.N.E. f. 6, 29.80 (too low); no westerly wind. Aug. 23, ship near 15 N., 67 W., E.N.E. f. 6, 29.83; ship near 18 N., 63 W., E.N.E. f. 6; ship near 18 N., 61 W., E.N.E. f. 8, 30.00; San Juan, N.E. f. 5, 29.89; Martinique, S. f. 2, 29.89; Dominica, no wind, 29.89. Aug. 24, Port-au-Prince, E. no speed, 29.83, barometer down from 29.94 the previous day; ship near 17 N., 72 W., W. f. 3, 29.77; center probably located near the Barahona peninsula. Aug. 25, Kingston, E.N.E. f. 4, 29.83 (maybe too low); ship near 21 N., 74 W., S.E. f. 3, 30.00 (too high); ship near 20 N., 73.7 W., E. f. 3. Aug. 26, Santa Cruz del Sur (Camaguey province), N.E. f. 3; ship near 24 N., 74 W., S.E. f. 6, 30.00; ship near 27 N., 74 W., S.E. f. 6, 30.06; Key West, N.E. f. 2, 29.93; Jupiter, W. f. 1, 29.92. Aug. 27, Key West, W. f. 3, 29.90; Jupiter, S.W. f. 2, 29.90; Charleston, N. f. 3, pressure could not be read; Jacksonville, E. f. 2, 29.92, rain; Wilmington, N.E. f. 3, 30.01; ship near 33 N., 75 W., S.E. f. 2, 30.03; ship near 30 N., 77 W., S. f. 5, 29.77; frontal wave placed to the E. of Charleston. Aug. 28, Wilmington, N.W. f. 2, pressure could not be read; Hatteras, S.E. f. 3, 30.00; ship near 34 N., 74 W., S.E. f. 8, 30.06; ship near 36 N., 74 W., S.S.E. f. 8, 30.06; ship near 36 N., 74 W., 30.06; frontal wave placed to the E. of Wilmington. Aug. 29, frontal wave off Virginia; another wave placed over central Florida, lowest pressure 29.86 at Jacksonville with N.N.W. f. 3 wind suggested this new wave was off N.E. Florida coast (Historical Weather Maps, Aug. 1910). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) A tropical storm of moderate intensity developed over the eastern portion of the Caribbean Sea on Aug. 23 and after moving westward it passed northwestward over the Bahama Islands to a position a considerable distance off the Georgia coast where it recurved to the N.E., was obstructed by high pressure to the N. and E. and it was forced over Georgia and the Carolinas, causing torrential rains on Oct. 29-30 (Monthly Weather Review, Aug. 1910). Author's note: The heavy rains which affected Georgia and the Carolinas were not related to the original storm but to a second frontal wave which was near N.E. Florida in the morning of Aug. 29 as indicated in item 1). 3) Belen College Observatory, Aug. 23, 8 A.M. There are some indications of a cyclonic perturbation over the eastern Caribbean; its center should be to the W. of Guadeloupe at a distance of about 120 miles. It has not shown much energy so far. Its probable course is towards the W.N.W. L. Gangotri, S.J. (Diario de la Marina, Havana, Aug. 23, 1910, evening edition, p.4, col.1). 4) National Observatory. Based on observations received from St. Thomas, there is a perturbation to the S.E. of that island. It is probable that its course would be W.N.W. The Weather Bureau of Washington has confirmed this news at 11 A.M. today (Diario de la Marina, Havana, Aug. 23, 1910, evening edition, p.4, col.1). 5) Belen College Observatory, Aug. 23. We have received this afternoon the following message from Washington: "Tropical perturbation forming in the Caribbean Sea S.E. of Puerto Rico, moving W.N.W.; intensity unknown. Moore." From 8 A.M. to 2 P.M. the center has remained almost stationary, with a little movement towards Puerto Rico. L. Gangotri, S.J. (Diario de la Marina, Havana, Aug. 24, 1910, morning edition, p.4, col.2). 6) National Observatory, Aug. 23, 5 P.M. On the basis of observations from St. Thomas, the center of the perturbation is now to the S. of Puerto Rico moving to the W.N.W. with unknown intensity (Diario de la Marina, Havana, p.4, col.2). 7) Washington, Aug. 23. A tropical disturbance, the first of this season, appears to be moving W.N.W. over the Caribbean Sea. Although three series of observations obtained during Tuesday failed to disclose either its intensity or exact location, at 6 P.M. (Thursday Aug. 23) the center seems to be about 100 miles S.S.W. of

Puerto Rico. Advices were sent to all places interested (The New York Times, Aug. 24, 1910, p.16, col.7). 8) Belen College Observatory, Aug. 24. The center of the cyclone was at 7:30 A.M. today to the S. of Haiti. Its influence will be felt at Jamaica and eastern Cuba from today to tomorrow. It has moved at a rate of 16 mph over the last 15 hours. L. Gangoiti, S.J. (Diario de la Marina, Havana, Aug. 24, 1910, evening edition, p.4, col.1). 9) National Observatory, Aug. 24. On the basis of observations received from Santiago de Cuba this morning, the perturbation appear to continue moving towards the fourth quadrant (Diario de la Marina, Havana, Aug. 24, 1910, evening edition, p.2, col.1). 10) Some observations, 8 A.M., Aug. 24. Santiago de Cuba, barometer 759.08 millimeters (29.89 inches), light N.N.E. wind. Camaguey, barometer 761.51, light E.N.E. wind (Diario de la Marina, Havana, Aug. 25, 1910, morning edition, p.5, col.2). 11) National Observatory, Aug. 24, 5 P.M. At 10:40 A.M. we received the following cablegram from Washington: "The storm center is located to the S. and near Santo Domingo, moving to the W. one quarter to the N.W. It appears to be of considerable intensity" (Diario de la Marina, Havana, Aug. 25, 1910, evening edition, p.5, col.4). 12) Washington, Aug. 24. The tropical disturbance was apparently central at 2 P.M. a short distance S.W. of Haiti. Observations have not afforded definite information as to its intensity but it is probably moving to the W.N.W. and warnings were issued that conditions will be unsafe in the western Caribbean during the next few days (The New York Times, Aug. 25, 1910, p.14, col.7). 13) Some observations, 8 A.M. Aug. 25. Santiago de Cuba, barometer 758.93 millimeters (29.88 inches), light S.S.E. wind. Camaguey, barometer 760.35 millimeters (29.94 inches), N. wind at 2.5 meters per second or 5.6 mph (Diario de la Marina, Havana, Aug. 26, 1910, morning edition, p.5, col.4). 14) National Observatory, Aug. 25, 6 P.M. The cyclonic perturbation appears to have moved slowly from yesterday to today. It might be getting ready for recurvature or changing its organization. L. G. Carbonell (Diario de la Marina, Aug. 26, 1910, morning edition, p.5, col.4). 5) Washington, Aug. 25. The West Indian disturbance is apparently central Thursday afternoon (Aug. 25) S.W. of Haiti but it is still beyond the field of observations without indication of further developments (The New York Times, Aug. 26, 1910, p.14, col.7). 16) Observatory of the College of Our Lady of Monserrat, Cienfuegos, Sept. 12. "The largest pressure variations during Aug., at all Caribbean stations took place from Aug. 23 to Aug. 24, and reached more than 5 millimeters (0.20 inches) at the island of Santo Domingo. It was the most important barometric wave" (Diario de la Marina, Havana, Sept. 16, 1910, morning edition, p.4, col.2). Author's note: Taken from an article by S. Sarasola, S.J. 17) Washington, Aug. 26. The West Indian disturbance has apparently disappeared to the eastward of Florida but barometric conditions continue unsettled over the extreme S. Atlantic coast and the eastern Gulf (The New York Times, Aug. 27, 1910, p.14, col.7). 18) Washington, Aug. 28. The disturbance in the Atlantic and a moderate depression over Florida have caused the persistence of the rains along the South and their extension N. to Southern New England (The New York Times, Aug. 29, 1910, p.8, col.7). 19) The apparent remnants of last week's tropical disturbance off the South Carolina and Georgia coasts was accompanied by heavy rain but without winds of consequence, although wireless reports indicate high N.W. winds off the coast (The New York Times, Aug. 30, 1910, p.14, col.7). 20) Washington, Aug. 30. Although pressure has risen along the South Atlantic coast, wireless reports indicate the presence of heavy rains and squalls off shore and the rains also will continue from Virginia to Florida (The New York Times, Aug. 31, 1910, p.14, col.7). 21) A storm was first observed near 15 N., 56 W. on Aug. 23, 1910 and lasted 8 days; it was last observed near 26 N., 100 W. (Mitchell, 1924). Author's note: The track in Tannehill (1938) was quite similar to the corresponding one in Mitchell (1924). However, the track in Neumann et al. (1993) was started near Barbados on Aug. 20, three days earlier, but was ended in the vicinity of 26 N., 100 W. The three tracks above combined tracks for two storms, one generating near the Lesser Antilles and the other in the Gulf of Mexico, which were found to be independent in reality.

On the basis of information contained in the above items, the author of this study prepared a track for Storm 1, 1910 which, strictly speaking, cannot be compared with the track in Neumann et al. (1993) because of the reasons explained in the author's note corresponding to item 21). 7 A.M. positions along the author's track were as follows: Aug. 23, near 15.5 degrees N., 63.7 degrees W., based on an analysis of information in items 1) through 7); Aug. 24, near 18.0

degrees N., 71.5 degrees W., chiefly based on information in item 1) and, to a lesser extent, in items 8), 10), 11) and 16); Aug. 25, near 21.3 degrees N., 76.7 degrees W., primarily based on information in items 1) and 13); Aug. 26, near 27.5 degrees N., 79.0 degrees W., based on information in item 1); Aug. 27, near 31.7 degrees N., 78.7 degrees W., based on information in item 1); Aug. 28, near 34.0 degrees N., 77.0 degrees W., based on information in item 1); Aug. 29, near 37.0 degrees N., 74.0 degrees W., based on information in item 1). The author's track for Storm 1, 1910 is displayed in Fig. 2.

Primarily on the basis of a ship reporting an E.N.E. f. 8 wind on Aug. 23 (item 1) and, to a lesser extent, on the basis of the largest pressure variation of more than 0.20 inches at Hispaniola from Aug. 23 to Aug. 24 (item 16), the author of this study gave tropical storm status to Storm 1, 1910, as Neumann et al. (1993) had done for their combination of two storms. Tropical storm intensity was denoted along the author's track for the period Aug. 23-26, although there were strong indications that the system weakened to a simple depression after making landfall on the Barahona peninsula (Hispaniola) on Aug. 24 and that it did not regain tropical intensity before changing to extratropical on Aug. 27. The latter stage was denoted along the author's track for the period Aug. 27-29.

Storm 2, 1910 (Aug. 26-31), T. S.

This storm is included in Neumann et al. (1993) as a portion of their Storm 1, 1910. Indeed, the storm developed in the northwestern Gulf of Mexico independently from the above mentioned storm and, from that point of view, it can be considered as a new case which has been isolated from a track containing a combination of two different storms.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Aug. 26, ship near 27 N., 88 W., S. f. 4; ship near 27 N., 91 W., S.E. f. 3, 29.83 (not clearly read); ship near 24 N., 93 W., E.N.E. f. 1; center placed 25.3 N., 91.7 W., too far S. Aug. 27, ship near 28 N., 90 W., E.S.E. f. 5, 29.94, rain; Galveston, N. f. 4, 29.96; Corpus Christi, N. f. 2, 29.95; Brownsville, W. no speed; center not drawn on map but probably near 26.7 N., 93 W. Aug. 28, Galveston, E. f. 3, 29.91, rain; Corpus Christi, N. f. 3, 29.85; ship near 28 N., 92 W., E. f. 4, 29.91; second ship in about the same position, E.S.E. f. 4, 29.91; center not drawn but probably near 26.5 N., 94.5 W. Aug. 29, ship near 28 N., 93 W., E.S.E. f. 3, 29.83; Galveston, E. f. 4, 29.90; Corpus Christi, N. f. 3, 29.84; Brownsville, N.W. no speed, 29.80; center placed 26 N., 94.5 W., too far E. Aug. 30, Galveston, E. f. 4, 29.92; Corpus Christi, N. f. 3, 29.86, rain; Brownsville, N.W. no wind, 29.91, probably too high; center not drawn on map but probably near 26 N., 96.5 W. Aug. 31, Galveston, E. f. 2, 29.95; Corpus Christi, E.N.E. f. 3, 29.89; Brownsville, E. no speed, rainfall in past 24 hours was 5.72 inches; center not drawn on map but probably near 25.3 N., 98 W. over extreme N.E. Mexico (Historical Weather Maps, Aug. 1910). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) While the disturbance (Storm 1, 1910) was in progress off the South Atlantic coast another storm developed over the middle Gulf and moved thence westward and passed inland near the mouth of the Rio Grande on Aug. 31. Advisory warnings were issued on Aug. 27 and N.E. storm warnings were ordered for the Texas coast the morning of Aug. 30. High winds and high tides were experienced along the lower Texas coast and there was some damage to property in the vicinity of Brownsville (Monthly Weather Review, Aug. 1910). 3) Washington, Aug. 31. The western Gulf of Mexico disturbance has apparently moved into Mexico with no unusual occurrences reported from the stations of observation (The New York Times, Sept, 1, 1910, p.10, col.7). 4) The maximum wind velocity at Corpus Christi was E. 48 mph on Aug. 30 (Monthly Weather Review, Aug. 1910). 5) The minimum pressure at Corpus Christi during Aug. 1910 was 29.76 inches, apparently without being reduced to sea level (Weather Bureau, 1912). Author's note: It is very likely that this pressure value was recorded in relation to this storm. 6) Storm of Aug. 31, 1910. Lower Texas coast. Minor (Dunn and Miller, 1960). 7) A storm was first observed near 15 N., 56 W. on Aug. 23, 1910 and lasted 8 days; it was last observed near 26 N., 100 W. (Mitchell, 1924). Author's note: Storm 2, 1910 was included as the western portion of the corresponding track in Mitchell (1924). The same is true for tracks shown in

Tannehill (1938) and Neumann et al. (1993) which, as the one in Mitchell (1924), actually represent a combination of portion of Storm 1, 1910 and Storm 2, 1910.

On the basis of information contained in the above items, particularly in items 1) and 2), the author of this study prepared a track for Storm 2, 1910. Author's 7 A.M. positions along his tracks were estimated as follows: Aug. 26, near 26.7 degrees N., 91.7 degrees W.; Aug. 27, near 26.7 degrees N., 93.0 degrees W.; Aug. 28, near 26.5 degrees N., 94.5 degrees W.; Aug. 29, near 26.3 degrees N., 95.5 degrees W.; Aug. 30, near 26.0 degrees N., 96.5 degrees W.; Aug. 31, near 25.3 degrees N., 98.0 degrees W. Although a rigorous comparison of this track with the combined track of two storms in Neumann et al. (1993) would not be appropriate, it should be noted that both tracks show the storm to have made landfall on the extreme N.E. coast of Mexico on Aug. 31. The author's track for Storm 2, 1910 is shown in Fig. 2.

On the basis of the N.E. 48 mph maximum velocity at Corpus Christi (item 4) and the storm description contained in item 2), the author of this study decided to give tropical storm status to this weather system as Neumann et al. (1993) did for the combination of Storm 1, 1910 and Storm 2, 1910. Therefore, tropical storm intensity was denoted for the entire period Aug. 26-31 in spite of that the author believes that such intensity was not reached until Aug. 30. The depression (dissipation) stage was introduced after the storm had moved well inland N.E. Mexico in the afternoon of Aug. 31.

Storm 3, 1910 (Sept. 5-15), H.

This storm is the same one which Neumann et al. (1993) identify as Storm 2, 1910.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 5, ship near 18 N., 58 W., E.S.E. f. 7, rain; Guadeloupe or ship nearby, N.E. f. 5, 29.88; Barbados, S.S.E. f. 4, 29.93; Grenada, N.N.E. no speed; Dominica, no wind, 29.94; Martinique, E. f. 4, 29.94; San Juan, E. f. 4, 30.00; ship near 21 N., 64 W., E. f. 6, 30.06; Sept. 6, ship near 18 N., 63 W., E. f. 9, 29.94; San Juan, N.E. f. 5, 29.97; ship near 20 N., 64 W., E. f. 6, 30.00; Dominica, no wind, 29.95; Martinique, S.E. f. 29.96; Barbados, S.E. f. 3, 29.99; Grenada, E. no speed, 29.98; ship near 18 N., 67.3 W., N.E. f. 5; ship near 16 N., 67 W., N.E. f. 6. Sept. 7, ship near 19 N., 67 W., E. f. 7, 29.88; San Juan, E. f. 5, 29.95, rain; Santo Domingo, N. f. 3; Turks Is., N.E. f. 5, 30.03; ship near 22 N., 67 W., E. f. 5, 30.06. Sept. 8, Port-au-Prince, E. no wind; Santo Domingo, calm; Turks Is., E. f. 5; ship near 22.7 N., 74 W., E. f. 5, 30.03; ship near 19 N., 76 W., N.N.E. f. 6, 29.80, rain; ship near 20.8 N., 74 W., N.E. f. 8, 29.80; Kingston, N. f. 1, 29.84; station W. of Kingston, E. to E.S.E. f. 2, 29.88. Sept. 9, Kingston, N. f. 2, 29.88; station W. of Kingston, S.E. f. 2, 29.86; ship near 15.5 N., 77 W., E. f. 4, 29.91; ship near 23 N., 79 W., E. f. 3; ship near 22.3 N., 76 W., E. f. 4, 29.94; Havana, E. f. 2, 29.97. Sept. 10, Key West, S.E. f. 3, 29.90 (not clearly read); ship near 24 N., 83 W., E. f. 4; Havana, S.E. f. 3; Batabano (southern coast of Havana province) or ship nearby, S.E. f. 4, 29.86; ship near 22 N., 85 W., W. to W.N.W. f. 2; ship near 21 N., 86 W., N. f. 1, 29.83; ship near 17 N., 83 W., E. f. 1, 29.86; station W. of Kingston, S.E. f. 7, 29.86. Sept. 11, ship near 25 N., 84 W., S.S.E. f. 5; Havana, S.S.E. f. 3, 29.99; station W. of Kingston, S.E. f. 8 (or 9), 29.88; ship near 22 N., 87 W., W.S.W. f. 2, 29.83; ship near 23 N., 86.7 W., calm, 29.88; Merida, calm, 29.91; ship near 22 N., 90.7 W., N.E. f. 3; ship near 27 N., 87.7 W., E.N.E. f. 6 (speed not clearly read), 29.97. Sept. 12, ship near 28.7 N., 87 W., E. f. 5, 29.94, lightning; ship near 27 N., 88 W., E. f. 4; ship near 27.5 N., 91 W., N.E. f. 5, showers; ship near 21.5 N., 91 W., W. f. 3, 29.86; Merida, calm, 29.88; ship near 20.8 N., 87 W., S.S.W. f. 3, 29.86; ship near 22.8 N., 85 W., E. f. 5; low placed near 23.5 N., 89.5 W., for first time a closed isobar was drawn on the map, its value was 1010 millibars (29.83). Sept. 13, Brownsville, N. no speed, 29.90; Corpus Christi, N. f. 4, 29.95; ship near 27.7 N., 92.8 W., E. f. 5, 29.97; ship near 26.7 N., 89 W., E.S.E. to S.E. f. 5, rain; ship near 21.7 N., 95 W., N.W. f. 5, 29.86; Merida, S. f. 2, 29.88; ship near 19.8 N., 91.7 W., W.N.W. f. 3, pressure could not be read; ship near 19.7 N., 91 W., S.W. f. 3 (speed not clearly read), pressure could not be read; low placed 24.5 N., 91.5 W. but it could be a bit E. Sept. 14, Brownsville, N. no speed, 29.79 (not clearly read; Corpus Christi, N. f. 6 (speed not clearly read),

29.90; ship near 27 N., 89 W., S.S.E. f. 7, 30.03; low placed 24.5 N., 94.7 W., probably a bit E. and perhaps S. Sept. 15, Corpus Christi, N.E. f. 4, 30.01; Brownsville, E. no speed, 29.89; ship near 22 N., 93 W., S.E. f. 5, 29.88; low placed 22 N., 95.7, too far E. and S. Sept. 16, system no longer identified (Historical Weather Maps, Sept. 1910). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) On the morning of Sept. 6 conditions in the eastern Caribbean were unsettled and a 6 P.M. special from San Juan, Puerto Rico, showed a steady fall of the barometer accompanied by high wind. During the night of Sept. 6, at San Juan, the velocity increased to 72 mph from the N.E. with lowest barometric pressure 29.76 inches at 7:20 P.M. The center of the storm passed S. of the island, causing considerable damage which was confined, however, to the north coast, east of San Juan; great havoc was reported by the telegraph and telephone companies to their lines and considerable damage was done by phenomenally heavy rain, which washed cane fields and raised rivers to unprecedented flood heights. Rainfall at some stations broke all previous records for intensity, a fall of 13 inches in 12 hours being reported from Comerio. Brisk to high N.E. winds, occasionally reaching hurricane force, prevailed over practically the entire island during the late afternoon and night of Sept. 6, the highest winds occurring between 7 and 8 P.M., with a secondary high velocity between midnight and 2 A.M. (Sept. 7). On the morning of Sept. 7 the storm was apparently central S.W. of Puerto Rico, moving in a W.N.W. direction. All shipping was advised as to the location and probably movement of the storm. On Sept 8 it was apparently central S. of the E. end of Cuba and on Sept. 10 was near the N. coast of Yucatan and moving N.W. It reached the Texas coast near the Rio Grande on Sept. 14. High winds and unusually high tides were reported on the Louisiana and Texas coast (Monthly Weather Review, Sept. 1910). Author's note: The above description was taken from an article by E.H. Bowie. Weather Bureau (1912) also published a description of this storm. 3) This case is known in Puerto Rico as the two storms of San Zacarias (II and III). Of the two tempests which visited the island on the day of San Zacarias, the one that caused some damage was coming from the E. (of the San Juan area). The storm that passed to the S. did not cause considerable damage. About the weather sequence at San Juan, Oliver Fassig wrote: "The wind increased to a gale and the rain fell in torrents, creating the impression in and about San Juan that the hurricane was upon us. As communication with the rest of the island was cut off during the early part of the storm, this impression deepened. The limited extent of the storm was not realized until the following day when news came from other parts of the island showing normal weather conditions over more of two-thirds of Puerto Rico...The storm was unusual in character... San Juan was within the area of greater violence... The steady N.E. direction of the wind in all portions of the storm area indicated a disturbance more on the nature of a squall moving from E. to W. than a local cyclonic storm; the rapid fall and rise of the barometer at San Juan gave distinct evidence however of a whirl". Great damage was caused by the unexpected visitor on the northern coast, east of San Juan, and on the east coast from Fajardo to Maunabo (Salivia, 1972). Author's note: The narrative of Oliver Fassig, then director of the Weather Bureau office at San Juan, suggests that the areal extent of severe storm conditions was more concentrated than stated in item 2). 4) Belen College Observatory, Sept. 6, 6 P.M. There were some indications this morning of a perturbation forming to the S. of St. Croix; at 3 P.M. its center was S.W. from that island, moving to the W.N.W. At 5:30 P.M. we have sent a cablegram to Washington saying that it would be felt with some intensity in Puerto Rico tonight and in Santo Domingo tomorrow. L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 7, 1910, morning edition, p.4, col.6). 5) Belen College Observatory, Sept. 7, 1910, 10 A.M. We received at about 11 P.M. last night the following telegram from Washington: "The center of the tropical storm is apparently S. of Puerto Rico tonight. San Juan reported that the barometer is constantly falling and that the highest wind velocity was 48 mph. Moore." Later observations indicated that the wind velocity (at San Juan) reached 72 mph. At 8 A.M. today the center is to the S. of the western extreme of Puerto Rico and by this time (10 A.M.) its influence will begin to be felt in the eastern portion of Santo Domingo; it will be felt in Jamaica and eastern Cuba between tomorrow and the following day. L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 7, 1910, evening edition, p.4, col.1). Author's note: The National Observatory also published the same message from the Weather Bureau of Washington in the same issue of the newspaper. 6) Belen College Observatory, Sept. 8, 9 A.M. Yesterday we sent a

cablegram to the Central Observatory of Mexico stating that the cyclone was to the S. of the eastern portion of Santo Domingo. At 8 A.M. today the center was to the S. of extreme western Haiti as we have informed the Weather Bureau of Washington by cablegram. Its influence will be felt in Jamaica and eastern Cuba from today to tomorrow. L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 8, 1910, evening edition, p.4, col.1). 7) National Observatory, Sept. 8, 10 A.M. According to telegrams received this morning, the cyclone which crossed Puerto Rico has continued to the N. of Santo Domingo, heading to the Bahamas. L.G. Carbonell (Diario de la Marina, Havana, Sept. 8, 1910, evening edition, p.4, col.1). Author's note: In reality, the cyclone continued S. of Santo Domingo and never headed for the Bahamas. 8) Belen College Observatory, Sept. 8, 6 P.M. The forward speed of the cyclone has been about 10 knots. At 5 P.M. its center was S. of Santiago de Cuba and E. of Jamaica; our latest telegram to Washington indicated that the cyclone was approaching Jamaica. At 4:45 P.M. we have received the following cablegram from Washington: "Center of the tropical storm at 4:30 P.M. near Jamaica, moving W. one quarter to N.W. Fresh E. wind along Florida coast. Danger to shipping in Cuban waters next two days. Moore". L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 9, 1910, morning edition, p.8, col.1). 9) Some observations taken at 8 A.M. Sept. 8: Camaguey, barometer 761.37 millimeters (29.98 inches), light N.E. wind. Santiago de Cuba, barometer 759 millimeters (29.88 inches), wind N.E. 5.5 meters per second or 12.3 mph (Diario de la Marina, Havana, Sept. 9, 1910, morning edition, p.8, col.1). 10) National Observatory, Sept. 8, 5 P.M. In spite of that observations from Santo Domingo this morning indicated that the cyclone was not felt there and the weather and the barometer at Jamaica do not indicate that the cyclone has continued moving W.N.W., observations from Santiago de Cuba and Santa Cruz del Sur this afternoon seem to indicate that the storm continues moving as assumed in the beginning. L.G. Carbonell (Diario de la Marina, Havana, Sept. 9, 1910, morning edition, p.8, col.1). Author's note: The 4:30 P.M. advisory from the Weather Bureau of Washington was also included in the bulletin furnished by the National Observatory. 11) Belen College Observatory, Sept. 9, 10:15 A.M. The center of the cyclone was this morning to the S.W. one quarter to the W. of Jamaica, with less intensity than on previous days. It will be S. of Grand Cayman tonight. Plenty of rain fell at Guantanamo during the night, but the wind was not strong (Diario de la Marina, Havana, Sept. 9, 1910, evening edition, p.4, col.1). 12) Belen College Observatory, Sept. 10, 10 A.M. The center of the cyclone is now in the Yucatan Channel or its vicinity, moving at a good rate. At 7 P.M. last night (Sept. 9) we sent the following cablegram to the Central Observatory of Mexico: "Cyclone S. of Grand Cayman, probably moving to the vicinity of Yucatan Channel". The cyclone is moving away from us L. Gangoiti, S.J. (Diario de la Marina, Havana, Sept. 10, evening edition, p.3, col.1). 13) National Observatory, Sept. 9, 5 P.M. The effect of the tempest in Cuba was the occurrence of some rains which have been propagating from E. to W. A cablegram received from the Weather Bureau of Washington this afternoon said that the center was at a good distance to the S. of central Cuba, loosing in organization (Diario de la Marina, Havana, Sept. 10, 1910, morning edition, p.10, col.1). 14) Some observations, Sept. 10, 8 A.M.: Pinar del Rio, barometer 758.2 millimeters (29.85 inches), wind E. 5.5 meters per second or 12.3 mph. Havana, barometer 758.8 millimeters (29.87 inches), wind S.E. 3.5 meters per second or 7.8 mph (Diario de la Marina, Havana, Sept. 11, 1910, morning edition, p.10, col.1). 15) Washington, Sept. 11. The tropical disturbance is apparently centered in the Gulf of Mexico some distance S.E. of the Texas coast. Warnings have been sent to vessel men that navigation may be dangerous during the next 24 to 36 hours in the N.W. Gulf (The New York Times, Sept. 12, 1910, p.18, col.7). Author's note: Statements in The New York Times were apparently issued the evening before their publication date. 16) The tropical disturbance is apparently central S. of the Gulf coast and it is already causing strong winds from Burwood to Galveston. Storm warnings are now disclosed from Pensacola to Port Isabel, Tx. (The New York Times, Sept. 13, 1910, p.13, col.6). 17) Washington, Sept. 13. The tropical storm is still moving slowly S.E. of the Texas coast and high tides are reported from Pensacola to Galveston; winds at observing stations have not increased much in velocity (The New York Times, Sept. 14, 1910, p.18, col.6). 18) Washington, Sept. 14. The tropical storm is now passing inland westerly from the Gulf of Mexico, the center being slightly S. of the mouth of the Rio Grande. It is causing high tides and E.N.E. and E.S.E. gales along the Texas coast. Torrential rains have

accompanied the storm (The New York Times, Sept. 15, 1910, p.18, col.6). 19) Washington, Sept. 15. The Gulf storm has passed into Mexico and after reaching the coast it has lost completely its identity (The New York Times, Sept. 16, 1910, p.18, col.7). 20) A velocity of 60 mph from the E. was reported from Corpus Christi during the 12 hours ending at 8 P.M. Sept. 14 and again at 8 A.M. Sept. 15. The tide in the Bay of Corpus Christi was higher than for several years (Monthly Weather Review, Sept. 1910). Author's note: A table which was also published in the Monthly Weather Review, Sept. 1910, showed the maximum velocity as 61 mph at Corpus Christi on Sept. 14; this value is 1 mph higher than the ones given above. 21) Other maximum wind velocities reported along the northern periphery of the storm in Texas were: Houston, S.E. 37 mph and Taylor, E. 42 mph, both on Sept. 14 (Monthly Weather Review, Sept. 1910). 22) Storm of Sept. 14, 1910. Lower Texas coast. Minimal. Padre Island wholly inundated (Dunn and Miller, 1960). 23) A storm was first observed near 16 N., 60 W. on Sept. 5, 1910 and lasted 9 days; it was last observed near 26 N., 97 E. (Mitchell, 1924). Author's note: Tracks for this storm in Tannehill (1938) and Neumann et al. (1993) are similar to the one in Mitchell (1924).

On the basis of information contained in the above items, the author of this study introduced some modifications along the track for this storm which Neumann et al. (1993) show as for Storm 2, 1910. 7 A.M. positions for the period Sept. 5-7 in the above publication were kept unchanged because they were found to agree with information in items 1) through 5). The 7 A.M. Sept. 8 position in the above publication was adjusted to the W. by about 90 miles to near 18.0 degrees N., 74.7 degrees W. in order to fit better information for that day in items 1), 6) and 9). The author's 7 A.M. Sept. 9 position was estimated near 19.5 degrees N., 80.7 degrees W. on the basis of information placing the storm at a good distance to the S. of central Cuba in the afternoon of that day (item 13) and on space-time continuity between author's positions for Sept. 8 and Sept. 10; information in items 11) and 12) was discarded because it apparently placed the system too far S. on Sept. 9; the author's 7 A.M. Sept. 9 position was about 140 miles to the W.N.W. of the corresponding one in Neumann et al. (1993). Primarily on the basis of information in items 1) and 14) the author's 7 A.M. Sept. 10 position was estimated near 22.3 degrees N., 84.7 degrees W.; this position was about 160 miles to the W.N.W. of the corresponding one in the above publication. Author's 7 A.M. positions for the period Sept. 11-14 were based on information in item 1) and were estimated as follows: Sept. 11, near 23.7 degrees N., 87.0 degrees W.; Sept. 12, near 24.0 degrees N., 89.5 degrees W.; Sept. 13, near 24.5 degrees N., 92.5 degrees W.; Sept. 14, near 25.3 degrees N., 96.3 degrees W.; these positions were found to be about 60 miles to the N.W., 40 miles to the S.W., 100 miles to the S. and 90 miles to the S. of the respective positions in Neumann et al. (1993). The track in this publication was extended to Sept. 15 by the author of this study, resulting in his 7 A.M. position for that day to be estimated near 25.0 degrees N., 99.0 degrees W., based on space-time continuity after taking into account that the storm center apparently moved inland slightly to the S. of the mouth of the Rio Grande in the evening of Sept. 14 (item 18). The author's track for Sept. 3, 1910 is shown in Fig. 2.

Although, rigorously speaking, the wind and pressure information in the above items failed to support the hurricane status which Neumann et al. (1993) gave to this storm as for Storm 2, 1910, the author of this study decided to retain that status on the basis of the maximum wind of 72 mph from the N.E. reported at San Juan in the evening of Sept 6 (item 2) and in spite of the characteristics of that wind which were discussed by Oliver Fassig (item 3); the use of the word "cyclone" (which, according to Cuban nomenclature of tropical weather systems, normally implies hurricane intensity) by the Belen College Observatory and the (Cuban) National Observatory (items 6 through 8 and 10 through 12) also carried some weight in the author's decision. After showing Storm 3, 1910 as a tropical storm on Sept. 5, hurricane intensity was introduced along the author's track on Sept. 6 and maintained until late on Sept. 8. Based on information indicating that the storm was less intense and disorganized on Sept. 9 (items 11 and 13), tropical storm intensity was reinstated along the author's track on that day and kept until Sept. 12, although wind information in items 1) and 14) showed that the system was certainly well below tropical storm intensity on Sept. 10 and probably remained as weak on Sept. 11. In a somewhat arbitrary manner, hurricane intensity was introduced for a second time along the author's track on Sept. 13, based on a ship observation near 21.7 N., 95 W. which reported a N.W. f. 5 wind that was apparently associated

with some strengthening of the wind field in the normally weak S.W. quadrant of the storm; this intensification was taken as representative of a general intensification of the system. Hurricane intensity was maintained until the storm made landfall on the coast of extreme N.E. Mexico in the evening of Sept 14 (item 18) and then was changed to tropical storm intensity. The depression (dissipation) stage was introduced in the morning of Sept. 15.

Storm 4, 1910 (Sept. 24-29), H.

This storm is the same one which Neumann et al. (1993) identify as Storm 3, 1910.

The following information was found in relation to this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Sept. 23, Bermuda, N.E. f.2, 30.13; ship near 31 N., 62 W., E.N.E. f. 4, 30.12; ship near 28 N., 62 W., E.S.E. f. 4; ship near 25 N., 65 W., E.N.E. f. 2; ship near 28 N., 59 W., S. f. 6, 29.94; ship near 31 N., 57 W., S.W. to S.S.W. f. 4; ship near 25 N., 60 W., S. to S.W.; center not placed on map and data showing a trough from about 30 N., 61 W. southwestward. Sept. 24, Bermuda, N.E. f. 3, 30.05; ship near 30 N., 61 W., E.N.E. f. 6; ship near 27 N., 62 W., N.E. f. 2, 29.77; ship near 25 N., 63 W., W.N.W. f 1 (or 3); frontal low placed 29 N., 62.5 W. but extratropical character could be questionable, low center appears to be S.E. of that position, with a weak flow to the S. of the center. Sept. 25, occluded system placed near Bermuda; Bermuda, N. f. 6 or higher, 29.65 (pressure was not clearly read from the map); extratropical character questionable. Sept. 26, occluded low placed 37 N., 61 W.; extratropical character questionable. Sept. 27, frontal wave placed 41 N., 58 W., maybe a bit W.; ship near 42 N., 57 W., E., f. 6 or higher, 29.77; this was the lowest pressure reported around the system. Sept. 28, ship near 40 N., 53 W., W. f.8; ship near 41 N., 56.5 W., N.E. f. 6, 29.80 (not clearly read); extratropical low placed 40.7 N., 52.5 W. Sept. 29, two lows of 995 millibars (29.38) centered 51 N., 62 W. and 41.5 N., 40 W., the second low appears to be the system of previous days. Sept. 30, big low placed near 58 N., 33 W. (Historical Weather Maps, Sept. 1910). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) On the morning of Sept. 21 there were indications of a disturbance S.W. of St. Kitts. This storm recurved to the northward and was next observed near the Island of Bermuda on the morning of Sept. 25, apparently moving N.N.E. (Monthly Weather Review, Sept. 1910). Author's note: The linkage of the disturbance near St. Kitts on Sept. 21 and the one near Bermuda on Sept. 25 does not seem to be supported by information in item 1). 3) Storm of Sept. 25, 1910. The Royal Gazette for Tuesday Sept. 27 tells us that "on Saturday afternoon (Sept. 24) Bermuda was apprised that a tropical storm was approaching. Telephones were immediately set to work and as a consequence preparations were made for its advent. It was scheduled to pass eastward of Bermuda: and it did... As it was, comparable little damage was done. So far as we are able at present to ascertain, St. George's suffered most; but taken all in all the sum of the loss to be chronicled is trifling. The hurricane spent itself at sea; and Bermuda has to rest thankful for a visitation, which if it did overturn a few banana trees and remove the slates from a few houses, yet furnished the tanks with an abundant supply of water, sufficient for the demand of many months". A more detailed list of damages gives exact accounts of windows blown in, houses unslated and a barque driven on a shoal at St. George's harbor. The entire camp of the Royal Engineers was blown down at Ferry Point and the Dickerson's Canteen department "had his whole outfit mixed up and cannot tell sugar from sand" (Tucker, 1982). 4) A hurricane that was central Sunday morning (Sept. 25) near and immediately E. of Bermuda will move N.N.E. and cause dangerous winds and stormy weather during the next several days over the North Atlantic steamship routes. On Sunday morning advices concerning this disturbance were sent to principal ports of the Atlantic coast and wireless telegraph stations were requested to advise vessels at sea of the position and direction of movement of this storm (Monthly Weather Review, Sept. 1910). Author's note: The above statement was taken from the weekly forecast issued Sunday, Sept. 25. 5) A storm was first observed near 26 M., 61 W. on Sept. 23, 1910 and lasted 8 days; it recurved near 33 N., 64 W. and it was last observed near 64 N., 21 W. (Mitchell, 1924). Tracks for this storm in Tannehill (1938) and Neumann et al. (1993) were found to be similar to portions of the track in Mitchell (1924).

Primarily on the basis of information contained in item 1), the author of this study introduced a number of modifications along the track which Neumann et al. (1993) show as for Storm 2, 1910. and extended that track to Sept. 29. The author's track was started on Sept. 24 or one day later than in the above publication; this action was based on the apparent lack of a closed circulation center on Sept. 23 (item 1). Author's 7 A.M. positions were estimated as follows: Sept. 24, near 28.3 degrees N., 61.3 degrees W.; Sept. 25, near 32.0 degrees N., 63.7 degrees W.; Sept. 26, near 37 N., 61 W.; Sept. 27, near 41.0 degrees N., 57.5 W.; Sept. 28, near 40.7 degrees N., 52.5 degrees W.; Sept. 29, near 41.5 degrees N., 40.0 degrees W. The difference between author's positions and the corresponding ones along the track in Neumann et al. (1993) ranged from about 70 miles on Sept. 24-26 to about 50 miles on Sept. 27-28. The author's track for Storm 4, 1910 is shown in Fig. 2.

The hurricane status that Neumann et al. (1993) gave to this storm as for Storm 3, 1910 was found to be supported by information in items 3) and 4) which addressed the storm as a hurricane. Hurricane intensity was denoted along the author's track from the early morning of Sept. 25 through early on Sept. 27. Tropical storm intensity was denoted along the author's track for the entire day of Sept. 24 and the extratropical stage was introduced on Sept. 27 and maintained until the track was ended on Sept. 29.

Storm 5, 1910 (Oct. 11-23), H.

This storm corresponds to Storm 4, 1910 in Neumann et al. (1993). This is the well-known "huracan de los cinco dias" (the five-day hurricane) in Cuba, which initially some meteorologists believed that there were two different storms and that later studies confirmed that it was a single hurricane which track described a loop in the Gulf of Mexico off the province of Pinar del Rio.

The following information was found about this storm: 1) Data extracted from 8 A.M. (E.S.T.) Historical Weather Maps: Oct. 7, ship near 10 N., 82.8 W., W. f. 1, 29.56, pressure too low. Oct. 8, ship near 10 N., 83 W., W. f. 1, 29.59, pressure too low. Oct. 9, ship near 13.8 N., 83 W., N.N.W. f. 5, 29.59, pressure too low, rain; ship near 12 N., 83 W., S. f. 2, 29.86. Oct. 10, ship near 16 N., 86 W., N.N.W. f. 5, 29.59, pressure too low. Oct. 11, ship near 16.7 N., 88 W., W. f. 4, 29.65, pressure too low; ship near 17.7 N., 83 W., E.S.E. f. 4, 29.80; ship near 12 N., 78 W., S.S.W. f. 4, 29.88, rain; low of 1000 millibars (29.53) placed 14.5 N., 82.5 W., probably too far N. and W. Oct. 12, ship near 14 N., 82 W., W.S.W. f. 10, 29.56; ship near 19 N., 79 W., E. f. 7, 29.80; low of 990 millibars (29.24) placed 16.3 N., 82.5 W., probably a bit E. Oct. 13, ship near 20 N., 83 W., N.E. f. 9, 29.32 (pressure not clearly read off the map); ship near 18 N., 80 W., S.E. f. 9, 29.74; ship near 18 N., 79 W., S.E. f. 9, 29.80; center of 990 millibars (29.24) placed 18.8 N., 83 W., probably a bit W. Oct. 14, Havana, S.E. f. 9, 29.58; Key West, S.E. f. 7, 29.81, rain; ship near 25 N., 84 W., E. f. 9, 29.77; ship near 25 N., 85 W., E.N.E. f. 7, 29.83; ship near 24 N., 86 W., N.E. f. 9, 29.77; ship near 19 N., 82 W., S. f. 9, 29.74; center placed 21.5 N., 83.5 W., too far S., it was very likely on the northern coast of Pinar del Rio near 23 N., 84 W. Oct. 15, ship near 24.7 N., 83 W. or Dry Tortugas, E.N.E. f. 9, 29.56; ship near 26 N., 86 W., N.E. f. 9, pressure could not be read; ship near 21.8 N., 87 W., N.N.W. f. 10, 29.65; ship near 21 N., 84 W., W.S.W. f. 8, 29.62, Havana, S. f. 6, 29.54; center placed 23 N., 84.5 W., probably a bit E. and S. Oct. 16, ship near 23 N., 86 W., N. f. 9; Dry Tortugas or ship nearby, E. f. 9, 29.50 inches; Key West, E. to S.E. f. 5, 29.59; Havana, S.S.E. f. 7, 29.55; ship near 21 N., 82.5 W., S.W. f. 9, 29.71; ship near 21 N., 83.3 W., S.W. f. 8, 29.56; center placed 23.3 N., 84.3 W., probably a bit E. Oct. 17, Havana, S. speed could not be read, pressure could not be read but very low; other stations could not be read off the map; center placed just W. of Havana, being a bit S. Oct. 18, Tampa, N. f. 6, pressure could not be clearly read but very low; Jupiter, S. f. 7, 29.30; Key West, S.W. f. 7, 29.52; center placed to the S.E. of Tampa. Oct. 19, data difficult to read; center placed near Jacksonville. Oct. 20, center placed between Wilmington and Hatteras. Oct. 21, center placed 37 N., 66 W., extratropical. Oct.

22, center placed 36 N., 61 W., extratropical. Oct. 23, center placed 36 N, 57.5 W.; ship just N.E. of center reported S.E. f. 7, 29.50. Oct. 24, center could not be identified, having been absorbed by the circulation of a huge low over Newfoundland-Labrador area (Historical Weather Maps, Oct. 1910). Author's note: Wind forces (f) are on Beaufort scale; pressures are in inches. 2) A number of valuable reports were received (via wireless) from vessels in the vicinity of tropical storms, that from the United Fruit Co.'s steamship "Abangarez", lat. 14 20 N., long. 81 51 W., received on the evening of Oct. 12, being particularly helpful in locating the most notable hurricane of the season, which struck Key West, Fl. on the afternoon of Oct. 17. Although the pressure had been below normal for several days previously, this wireless report was the first definite information the Weather Bureau had of the severe storm in the Caribbean (Weather Bureau, 1912). 3) Belen College Observatory, Oct. 12, 8 P.M. Observations received from the Monserrat College Observatory (Cienfuegos) this morning and those from our observatory this evening, indicate the existence of a cyclone, which center was this afternoon to the N. of Trujillo (Honduras) and E. of Belize. Its location is a serious threat to the western half of our island. L.Gangoiti, S.J. (Diario de la Marina, Havana, Oct. 13, 1910, morning edition, p.10, col.1). 4) Belen College Observatory, Oct. 13, 4:30 P.M. This morning we sent to Mexico and Washington the following telegram: "6 A.M. cyclone S.S.W. (of Havana) distant about 250 miles". This afternoon we sent another one to Washington: "Strong cyclone approaching the provinces of Pinar del Rio and Havana". Its effects will be felt with increasing intensity over the provinces mentioned and at Matanzas L. Gangoiti, S.J. (Diario de la Marina, Oct. 14, 1910, morning edition, p.8, col.1). 5) National Observatory, Oct. 13, 4 P.M. We are now inside the body of the storm and its center will pass to the E. (of us) tonight. Advices have been sent to Matanzas and Santa Clara provinces L.G. Carbonell (Diario de la Marina, Havana, Oct. 10, 1910, morning edition, p.8, col.1). Author's note: According to the content of this item it is obvious that Luis Garcia Carbonell, director of the National Observatory was expecting the storm to cross Cuba further to the E. than L. Gangoiti, S.J., director of the Belen College Observatory, was (item 4). 6) Washington Oct. 13. The tropical disturbance is now centered S. of the extreme western Cuba and apparently has great intensity. It will probably move N.W. over the Gulf of Mexico through the Yucatan Channel. High winds have been reported from Cuba and South Florida coast and storm warnings are displayed from Boca Grande to Miami, and cautionary advices have been issued to vessel interests (The New York Times, Oct. 14, 1910, p.18, col.7). 7) Taken from an article by M. Gutierrez-Lanza, S.J. of the Belen College Observatory, dated Oct. 22, 1910: Selected observations taken at the city of Pinar del Rio: Oct. 13, 2 P.M., 749.9 millimeters (29.52 inches), N.E. wind; 8 P.M., 741.1 millimeters (29.18 inches), N.E. wind; midnight Oct. 13-14, 730.1 millimeters (28.74 inches), N.E. wind. Oct. 14, 1 A.M., 724 millimeters (28.50 inches), E.N.E. wind; 2 A.M. 720.4 millimeters (28.36 inches), calm; 2:20 A.M, 722.8 millimeters (28.46 inches), calm; 2:45 A.M, 724.5 millimeters (28.52 inches), S.W. wind; 6 A.M., 729.5 millimeters (28.72 inches), S.W. wind; midnight Oct. 14-15, 744.2 millimeters (29.30 inches), S.W. wind. At Consolacion del Sur the wind blew from the N.E. until 3 A.M. Oct. 14 when the lowest barometer of 724.7 millimeters (28.53 inches) occurred, afterwards the wind veered to S.; the barometer rose to 742.1 millimeters (29.22 inches) by 10 P.M. Oct. 14. At Remates (de Guane), the wind changed from N.N.E. to W.S.W. during the night of Oct. 13-14, indicating that the vortex passed to the E. of that place; the barometric minimum occurred at midnight Oct. 13-14. Selected observations taken at Havana: Oct. 13, 10 P.M., 754.3 millimeters (29.70 inches), E. wind; Oct. 14, 2 A.M. 752.3 millimeters (29.61 inches), E.S.E. wind; 6 A.M., 751.6 millimeters (29.59 inches), S.E. wind; 2 P.M., 749.2 millimeters (29.50 inches), S.S.E. wind; 5 P.M., 748.4 millimeters (29.47 inches), S. wind; 10 P.M., 749.7 millimeters (29.52 inches), S. wind (Diario de la Marina, Havana, Oct. 23, 1910, morning edition, p.6, col.2). Author's note: In a second article by M. Gutierrez-Lanza, S.J. published in Diario de la Marina, Havana, Nov. 7, 1910, evening edition, p.2, cols. 3-6, he stated that the minimum pressure at Remates (de Guane) at midnight Oct. 13-14 was 724 millimeters (28.50 inches) as read off the barograph trace. 8) Washington, Oct. 14. The tropical storm caused destructive winds Friday and Friday night (Oct. 14) was located W.N.W. and near Havana with a barometric pressure at Havana of 29.04 inches. The maximum wind at Havana during the day was 88 mph and at Key West 60 mph. Hurricane

warnings are displayed along the coast of S. and central Florida (The New York Times, Oct. 15, 1910, p.18, col.7). Author's note: According to the observations taken at Havana (item 7), the pressure of 29.04 inches given in the above item was found to be erroneous. In addition, the maximum wind of 88 mph at Havana appears to be too high because, according to item 23), the wind at the National Observatory reached 50 mph with gusts to 72 mph. 9) At 8 A.M. Oct. 14, the steamship "Vigilance" was reported (apparently via wireless) about 180 miles W. of Sand Key with a barometer of 29.40 inches, and at the same time the steamship "Brazos" was 164 miles W. of Dry Tortugas and reported a strong gale with high seas from the E.N.E., pressure 29.82 inches. According to Mr. F.D. Young, in charge of the Weather Bureau office at Sand Key. the barometer began to fall (there) about midnight Oct. 12-13 and fell slowly but steadily to 29.55 inches at 5 P.M. Oct. 14. Much rain fell on the night of Oct. 13, and the wind velocity steadily increased. At 3:30 P.M. the waves began to wash over the island carrying the sand from under the light-house and shifting it to a position farther north. The barometer remained about 29.60 inches till 8 P.M. Oct. 16 (Monthly Weather Review, Oct., 1910). 10) Belen College Observatory, Oct. 15, 9 A.M. The center of the cyclone is now to the N.W. of Havana; it has entered the second branch of the parabola and heading towards Florida; therefore, the weather will be improving. L. Gangoit, S.J. (Diario de la Marina, Havana, Oct. 15, 1910, evening edition, p.2, col.3). 11) From a letter written by Mr. Garcia Carbonell of the National Observatory: "The cumulus clouds here (Havana) ran from S. to N. starting in the night of Oct. 13-14 and continued from that direction, without any change, until the night of Oct. 16-17" (Diario de la Marina, Havana, Oct. 25, 1910, morning edition, p.4, col.6). 12) Washington, Oct. 16. The position of the tropical disturbance in the Gulf of Mexico cannot be definitively determined from the observations at Weather Bureau stations but reports by wireless from vessels in the Gulf indicate that the storm is moving W. and that the center is already a considerable distance W. of the Florida Keys. The swell at Key West is gradually diminishing, while moderate swells on the N.W. coast at Galveston have been observed during the past 24 hours (The New York Times, Oct. 17, 1910, p.11, col.7). 13) Las Martinas, Oct. 18. At the port of La Fe, where the hurricane struck with great violence during the day and night of Oct. 16, the sea began to rise between 10 and 11 P.M. (Oct. 16), flooding the town, wharves and warehouses have been destroyed and 14 persons were drowned (Diario de la Marina, Havana, Oct. 24, 1910, morning edition, p.3, col.3). 14) San Juan y Martinez, Oct. 16. The barometer at this time, 3 P.M., is reading 746 millimeters (29.37 inches). Heliodoro Gil, correspondent (Diario de la Marina, Havana, Oct. 20, 1910, morning edition, p.9, cols. 4-5). 15) San Juan y Martinez, Oct. 17. At 6 P.M. yesterday (Oct. 16) the barometer, which was reading 740 millimeters (29.13 inches), began to fall and reached 728 millimeters (28.66 inches) at 3 A.M. this morning (Diario de la Marina, Havana, Oct.20, 1910, morning edition, p.9, cols. 4-5). 16) From an article by M. Gutierrez-Lanza, S.J. of the Belen College Observatory, dated Oct. 22, 1910: Some observations taken at the city of Pinar del Rio: Oct. 16, 2 A.M., 742.6 millimeters (29.24 inches), S.S.W. wind; 10 A.M., 743 millimeters (29.25 inches), S.S.E. wind; 3 P.M., 740.3 millimeters (29.15 inches), S.S.E. wind; 9 P.M., 737.1 millimeters (29.02 inches), S. wind; midnight Oct. 16-17, 733 millimeters (28.86 inches), S.S.E. wind; Oct. 17, 2 A.M., 728 millimeters (28.66 inches), S. wind; 2:40 A.M., 723.1 millimeters (28.47 inches), S. wind; 3:15 A.M., 727.1 millimeters (28.63 inches, S.S.W. wind; 5 A.M., 728 millimeters (28.66 inches), S.W. wind; 6 A.M., 729.2 millimeters (28.71 inches), W.S.W. wind; 7 A.M. 732 millimeters (28.82 inches), W. wind (Diario de la Marina, Havana, Oct. 23, 1910, morning edition, p.6, col.2). 17) Extracted from an article by M. Gutierrez-Lanza, S.J. of the Belen College Observatory, dated on Nov.5, 1910: Some pressure observations taken by the steamship "Prince Crown" in the Bay of Corrientes on the southern coast of the Guanahacabibes peninsula of the Pinar del Rio province: Oct. 15, 10 A.M., 737 millimeters (29.02 inches); 8 P.M., 729 millimeters (28.70 inches); Oct. 16, 7 A.M., 724 millimeters (28.50 inches); 5 P.M., 712 millimeters (28.03 inches); 8:45 P.M., 710 millimeters (27.95 inches); by 9:30 P.M. Oct 16 the ship had sunk but the crew survived. At Remates (de Guane) a barometer drop of 16 millimeters (0.63 inches) started around noon Oct. 15, reading a minimum of 730 millimeters (28.74 inches) at 9:30 P.M. Oct. 16, with hurricane force winds from the S. which later veered to W. At Consolacion del Sur, the barometer remained stationary around 740 millimeters (29.13 inches) during Oct. 15 and the

morning of Oct. 16; a new and rapid descend began about midday (Oct. 16) reaching a minimum of 720.07 millimeters (28.35 inches) at 4:10 A.M. Oct. 17, with wind from the S. which was destroying everything before it (Diario de la Marina, Havana, Nov. 7, 1910 evening edition, p.2, cols. 3-6). Author's note: The barometer readings taken on board the "Crown Prince look unreliable and most of them were probably too low by 0.50 inches or more. 18) It is said here (apparently Pinar del Rio) that the barometer dropped to 721 millimeters (28.39 inches) and that at La Esperanza (Puerto Esperanza) it reached 715 millimeters (28.15 inches), with the wind blowing always from the S.W. (Diario de la Marina, Havana, Oct. 21, 1910, morning edition, p.9, col.3). 19) Taken from a letter by Mrs. Eloisa Sanchez of Vinales: The intensity of the wind was such and its rigor so tremendous, around 2 A.M. Oct. 17, that the neighbors thought that the final hour has arrived and began praying to the Lord (Diario de la Marina, Havana, Oct. 24, 1910, evening edition, p.2, col.6). Author's note: Vinales is located near the northern coast of the central portion of Pinar del Rio province. 20) Guanajay, Oct. 18. During the night of Oct. 16-17 the barometer dropped again; and it dropped fast from 4 A.M. to 10 A.M. Oct. 17, when it began to rise. Mr. Pedro Nunez Lastrado's English barometer read 735 millimeters (28.94 inches and Mr. Cinta's German barometer at Cafe El Niagara dropped to 726.5 millimeters or 28.60 inches (Diario de la Marina, Havana, Oct. 20, 1910, evening edition p.4, col.4). 21) Some barometric observations taken at Havana: Oct. 16, 9 P.M., 749 millimeters (29.49 inches); midnight Oct. 16-17, 748 millimeters (29.45 inches); Oct. 17, 1 A.M., 746 millimeters (29.37 inches); 3 A.M., 744 millimeters (29.29 inches); 4 A.M., 743.5 millimeters (29.27 inches); 5 A.M., 742 millimeters (29.21 inches); 6 A.M., 740 millimeters (29.13 inches); 7 A.M., 739.5 millimeters (29.11 inches); 8 A.M., 739 millimeters (29.09 inches); 9 A.M., 737 millimeters (29.02 inches); noon, the barometer began to rise and the cyclone to abate (Diario de la Marina, Havana, Oct. 17, 1910, evening edition, p.1, col.2). 22) Belen College Observatory, Oct. 17, 9 A.M. At 11 P.M. last night we began to observe very suspicious indications in the atmospheric currents and the barometric pressure. At midnight we decided to notify the Mayor, the Chief Police Officer, etc. of the (cyclonic) danger; shortly afterwards Police went all around the city indicating the imminent presence of a new hurricane. At 6 A.M. this morning we sent the following telegram to Key West, Washington and Mexico: "Another intense hurricane is to the S.W. and near (Havana); probable course to the N.E." (Diario de la Marina, Havana, Oct. 17, 1910, evening edition, p.1, col.2). 23) Extracted from a note about the cyclone issued by the National Observatory: At 10 A.M. Oct. 17, when the center was approximately at (Dry) Tortugas, the wind here (Havana) reached 130 mph from the S.S.W., while when it passed W. of here along the first branch of its track it blew only at 50 mph with gusts to 72 mph. The barometer dropped to 733.33 millimeters at 10 A.M. Oct. 17 (Diario de la Marina, Havana, Oct. 20, 1910, evening edition, p.8, col.7). 24) Washington, Oct. 17. The cyclone which passed near Havana this morning has moved northward. Shipping interests have been advised of the progress of this dangerous storm beginning since Thursday last, Oct. 13 (The New York Times, Oct. 18, 1910, p.16, col.6). 25) There is some evidence that two tropical disturbances, one closely following the other, passed over the western end of the island of Cuba during the second decade of Oct. 1910, both of which caused most damage in Cuba. These storms took quite distinct courses. The first after passing over Havana and slightly W. of Key West, Fl. lingered N.W. of the Florida Keys for two days and then appeared to dissipate in the central part of the Gulf of Mexico; while the second storm moved northward over central Florida and passed eastward into the Atlantic off the coast of South Carolina (Monthly Weather Review, Oct. 1910). Author's note: Information contained in the above item appears to contradict the last statement in item 24) which suggested the presence of only one storm. 26) Oct. 13-18, 1910. Two terrible hurricanes crossed over the province of Pinar del Rio, the second one partially overtaking the first. Their destructive effects, particularly those associated with the second one, were also very intense in the province of Havana as well, and were also felt at Matanzas and Santa Clara. The force developed by these two hurricanes exceeded any evaluation, and damage was enormous on land and at sea. Many lives were lost, but the exact number cannot be determined (Sarasola, 1928). Author's note: Actually taken from the catalog of Cuban cyclones by M. Gutierrez-Lanza which is included in Sarasola (1928). 27) From Oct. 13 to Oct. 17, 1910 a cyclone was felt at Pinar del Rio and Havana (provinces). It caused great damage and called the attention of observers because of

the loop described by the track during its recurvature. As some people believed that there were two cyclones, some discussions took place about this storm (Martinez-Fortun, 1942). 28) Extracted from an article under the title Anomalous Storm Tracks by E.H. Bowie: As there has been considerable doubt as to the track his hurricane (of Oct. 1910) actually followed, it was recently made the subject of a special study, all the available data from land observatories and vessels in that region being used in preparing the daily synoptic charts by the Observatorio Nacional, Casa Blanca, Havana, Cuba and later by the Weather Bureau, Washington, D.C. The study at Havana of the hurricane of Oct. 1910 was made by Dr. Jose Carlos Millas, Director, Observatorio Nacional, assisted by Dr. Carlos Theye, Mr. Manuel Maria Garcia Blanco and Mr. Miguel Gutierrez. Dr. Millas, in a recent letter to the Chief of the Weather Bureau concerning this study, wrote as follows: "The following hypotheses have been studied in the effort to explain the bad weather during five days of Oct. 1910 in the western part of Cuba. 1. Elliptical form of cyclone. 2. Inclination of the axis. 3. Loop. 4. Bell-shaped parabola. 5. Point d'arret. 6. Two cyclones. 1. The elliptical form of cyclone, the inclination of the axis, the bell-shaped parabola, and the point d'arret can not explain the observed phenomena. 2. The hypothesis of two cyclones has also been rejected for the following reasons: a) Due to theoretical reasons, two cyclones of considerable intensity can not coexist in such close proximity. b) Because vessels in the Gulf of Mexico and in the N.W. Caribbean Sea for the days in question always showed winds inclined towards a single center. c) Because the barometers of these vessels and those in the western part of Cuba during Oct. 14, Oct. 15 and Oct. 16; the direction and violence of the winds; the direction of low clouds; everything pointed to the fact that the hurricane center that had passed a short distance to the W. of Pinar del Rio had not traveled far and never could it be admitted that it had disappeared. d) All the winds in the western part of Cuba, after the night of Oct. 13 correspond, according to known laws, to the lower (southern) part of a hurricane. 3. The path of a second hurricane south of Cuba, from Oct. 14 to Oct. 16 is opposed to the observed facts. 4. The loop hypothesis has been accepted. The form and dimensions of the loop can not be determined for lack of necessary observations; those known satisfy the path indicated". The study made at the Central Office of the Weather Bureau by Wilfred P. Day confirms the presence of but one hurricane, which followed closely the track shown in figure 1 (Monthly Weather Review, Mar. 1922). Author's note. Figure 1 refers to that figure on Bowie's article and showed, among others, the loop track corresponding to the hurricane of Oct. 1910. 29) The cyclone remained approximately in lat. 23 N., long. 85 W. for three days, while describing the loop and its progressive motion during this period was extremely slow. Observations collected and plotted to determine the track of the hurricane were numerous on several days. The circulatory movement of the winds, uninfluenced by any appreciable progressive motion of the storm, and almost wholly over water areas, is shown clearly by the symmetrical with respect to the storm center, to and inclination inward to the center in all quadrants. There were no pronounced inequalities in wind force in the various quadrants as observed in the cases of hurricanes moving forward at usual speeds (Tannehill, 1938). 30) Seven sectional maps showing wind data and isobars for the mornings of Oct. 12-16, the evening of Oct. 16 and the morning of Oct. 17; a map showing the entire track from Oct. 11 to Oct. 18 is also included. As read from the morning and evening maps, storm positions were as follows: Oct. 12, A.M., 16.0 N., 81.5 W.; Oct. 13, A.M., 19.5 N., 82.5 W.; Oct. 14, A.M., 23.0 N., 84.0 W.; Oct. 15, A.M., 23.7 N., 85.0 W.; Oct. 16, P.M., 22.5 N., 85.3 W.; Oct. 17, A.M., 23.3 N., 83.7 W. (Mitchell, 1924). Author's note: Loops in Academia de Ciencias (1970) and in Instituto Cubano de Geodesia y Cartografia (1978) showed relatively minor differences from the one based on the above positions and displayed along the Oct. 11-18 storm track in Mitchell (1924). 31) Taken from a report by Capt. Sullivan of the steamship "Jean": We passed Key West at 11:55 P.M. Oct. 16. At the beginning of the hurricane the position was made from well-known landmarks, lat. 24 26 N, long. 82 41 W. Ship hove to. The storm lasted from 5 A.M. to 8 P.M. (Oct. 17), during which time the ship drifted against unusually strong stream from the Gulf 60 miles in a direction S.W. by W. one half W. During this time it was impossible to see the sea on account of the rain and spray. Immense seas came over the ship even wetting down the chart house on the bridge deck, so that water had to be constantly baled out. At 11:25 A.M. the ship arrived at the center of the storm. Overhead the sky was perfectly clear, but the horizon was dirty, wind

almost calm and sea fearfully choppy. At 1 P.M. the wind came fiercely from the W.N.W. of hurricane force, lasting until 7:30 P.M. when it began to moderate. The wind blew hardest when the barometer was between 28.10 and 28.30 (inches), both going up and down. The barometer at the time of reaching the center at 11:25 A.M. was below the scale, but was carefully marked with a set hand, and subsequently with a file. This was estimated by means of a paper protractor by Mr. Wurtz as 27.72 inches, which with present correction would be 27.80 inches. The barometer rose slightly on entering the center. Ship position at that time approximately 27 miles S. of (Dry) Tortugas (Monthly Weather Review, Oct. 1910). Author's note: The experience of the steamship "Jean" while passing through the hurricane was also published in Mitchell (1924) and in The Tampa Morning Tribune, Oct. 21, 1910, p.10, col.4). 32) The steamers "Comus" and "Brazos" passed through the hurricane which swept the Gulf of Mexico; both vessels arrived at New York yesterday. The "Comus" left New Orleans on Oct. 12 and the "Brazos" left Galveston the same day. The "Brazos" reached her pier late in the afternoon bearing many scars of the lashing she received. For 72 hours the "Brazos" fought the storm against almost overpowering odds. For three days and nights Capt. William F. Evans remained on the bridge, keeping the vessel under steering. Many of the passengers had given up hope of ever seen shore again. The steamer rolled and tossed in the terrific sea, and the passengers were too frightened to be sick... The wireless was washed away with the breaking of the storm... On Saturday (Oct. 15) the electric light went out, and for two days the "Brazos", in darkness, plunged through the storm... When the storm passed, suddenly Havana appeared through the scattering clouds. Then Capt Evans got his first bearing in three days. Morro Castle is 60 miles off the regular course of the "Brazos", but her log shows that she traveled 182 miles from the time she left her course until she sighted the Cuban coast. "It was the worst blow i ever experienced", said Capt. Evans. "The barometer registered 27.10 (inches), the lowest I ever saw... The storm struck us with indescribable fury. Water poured down the funnels It looked as though the elements were trying to tear the sea up by the roots. There was no electrical display, but the rain came down in bucket fulls. The wind at times blew 100 mph. Some of the passengers thought they were going to the bottom. They were of great assistance, however, when I ordered all hands to the pumps to stem the flood of water which poured through the port windows"... The voyage of the "Comus" was equally strenuous. For three days the storm pounded her but she rode the waves and reached port little the worse for her battle with the elements (The New York Times, Oct. 22, 1910, p.5, cols. 3-4). Author's note: It is difficult to determine how much reliable the barometer reading of 27.10 inches reported by Capt. Evans of the "Brazos" was; however, the reading of 29.82 inches reported by the "Brazos" in the morning of Oct. 14 (item 9), before entering the storm, look reasonable. Taken into account the extreme violence of this hurricane, such a low reading cannot be discarded and, if it were correct, would make of the storm of Oct. 1910 a Category 5 hurricane on the Saffir-Simpson scale. 33) At Sand Key, Fl. the wind blew from the S.E. up to 1:05 P.M. (Oct. 17) when it changed to S. The velocity increased and the swaying of the building stopped the clock several times. The gusts sometimes lasted several minutes and their estimated velocity was 125 mph. At 1:50 P.M. the barometer reached its lowest point, 28.40 inches. About 3:30 P.M. the barometer began to rise slowly but the wind continued with unabated fury until 6 P.M., when it began to subside and shifted to S.W. After the storm was over the island was completely covered with water about 2 feet deep at its shallowest point and about 5 feet deep under the light-house (Monthly Weather Review, Oct. 1910). Author's note: The above information was extracted from a report by F.D. Young, Assistant Observer. A shorter description of the storm at Sand Key was published in Mitchell (1924). 34) At Key West, Fl., the atmospheric pressure rose slightly on Oct. 16 to 29.60 inches. At 10 P.M. it began to fall rapidly and reached its lowest reading, 28.47 inches, at 3:20 P.M. Oct. 17. A gradual rise in pressure followed to 29.29 inches at midnight Oct. 17-18 and to 29.75 inches at midnight Oct. 18-19. Brisk to high N.E. winds varying in velocity from 30 to 50 mph with gusts up to 60 mph prevailed from midnight to 8 A.M. Oct. 17, shifting to S.E. after 8 A.M. and increasing in velocity to from 48 to 80 mph. At 12:25 P.M. Oct. 17 the wires of the anemometer cups were torn away by the wind at the moment when the velocity was 72 mph. From 3 to 4 P.M., the wind was from the S., after which it shifted to S.W. and continued steady in that direction during the remainder of Oct. 17 and on Oct. 18. The wind reached its greatest force between 2:30

and 4:30 P.M. Oct. 17, when it was estimated that the highest velocity was over 90 mph and that gusts of 110 mph were frequent. The wind lessened slightly after 5 P.M. , but continued during the night until 3 A.M. Oct. 18 with a velocity of 60 mph, after which it gradually diminished. The storm lasted 30 hours. The tide and the sea swell were unusually high. By 9 A.M., the Weather Bureau grounds in the S.W. section of the city were entirely submerged, and by 3 P.M. the basement of the building was covered with water to a depth of 7 feet (Monthly Weather Review, Oct. 1910). Author's note: The above information was extracted from a report by C.J. Doherty, Observer. Mitchell (1924) also published a similar description of the hurricane at Key West. 35) At 4 P.M yesterday (Oct. 17) the barometer at Maynard's window (Miami) registered 29.30 inches but at 7 A.M. today had dropped to 29.50 inches and showed a gradual rise at 9 A.M. The Miami River and Biscayne Bay reached out beyond their banks and a number of vessels were up the banks and on the docks (The Daily Metropolis, Miami, Oct. 18, 1910, p.1, col.7). 36) Long overdue, the schooner "Helen Thomas" arrived (at Tampa) yesterday from Bangor, Me. Sept. 2. "On the afternoon of Oct. 17, Capt. Lermond said, when about 60 miles N.N.W. of (Dry) Tortugas about 5:30 P.M. the barometer reached its lowest point which was 28.80 inches. During the storm the vessel was forced to the S.W. 188 miles from her course". We had the wind out of the S.E., shifting to the E.S.E. and E., then came a period of dead calm at which hundreds of birds knocked at the schooner. The gale then shifted to the N.E. (it should probably read N.W.) and from this point the storm reached its climax (The Tampa Morning Tribune, Oct. 29, 1910, p.10, col.2). Author's note: The position given by Capt. Lermond as 60 miles N.N.W of Dry Tortugas appears to be too far W.; a position to the N. or N.N.E. of Dry Tortugas would be more reasonable because the schooner reported to have been in the eye of the storm. 37) Ft. Myers, Oct. 18, 9 A.M. The following records being from the office of the Ft. Myers Press, in the business district of the city: Oct. 17, noon, 29.70; 4:30 P.M., 29.44; 7 P.M., 29.30; Oct. 18, 12:30 A.M., 28.20; 9:20 A.M., 29.47. This is the lowest pressure ever recorded at this point (The Tampa Morning Tribune, Oct. 22, 1910, p.3, col.5). Author's note: Pressures are in inches. 38) At Tampa, by the night of Oct. 17 the wind was blowing a gale still from the N.E., coming in violent puffs followed by lulls. At midnight Oct. 17-18 the barometer had fallen to 29.30 inches. The wind increased during the early morning hours of Oct. 18, attaining an extreme velocity of 60 mph at 2:37 A.M., but it is believed that momentary gusts reached a velocity of at least 70 mph, although the maximum recorded for a continuous 5-minute period was 48 mph at 2:18 A.M. The lowest pressure by corrected barograph was 28.94 inches at 7:45 A.M. Oct. 18. By this time the wind had shifted to N.W., and by 11 A.M. it had become W., where it remained until the storm velocity had ended (Monthly Weather Review, Oct. 1910). Author's note: The above information was extracted from a report by George G. Wurtz, Local Forecaster. The Tampa Morning Tribune, Oct. 19, 1910, p.1, cols.1-2, and Mitchell (1924) also published information about the storm at Tampa. 39) At Jupiter the lowest atmospheric pressure was 29.21 inches at 3 A.M. Oct. 18 and, from 12:20 A.M to 6 A.M. Oct. 18, the wind velocity ranged from 60 to 70 mph. At Jacksonville, the barometer began to fall more rapidly after the morning observation of Oct. 17 but did not reach its lowest point, 29.09 inches, until 12:30 P.M. Oct. 19; the wind did not attained any great velocity until Oct. 18, when it increased steadily from the N.E. and reached a maximum velocity of 56 mph at 4:05 P.M. At Savannah, reached its highest velocity, 70 mph from the N.E., at 1:30 A.M. Oct. 19 and the lowest atmospheric pressure was 29.30 inches at 2 P.M. the same day. At Charleston, the lowest atmospheric pressure attained during the storm was 29.39 inches at 6:20 P.M. Oct. 19 and the maximum wind velocity of 58 mph occurred at 1:40 A.M. Oct. 18 (it should read Oct. 19) when the wind became S.E. (Monthly Weather Review, Oct. 1910). Author's note: Some of the information contained in the above item was also published in Mitchell (1924). The maximum wind velocity at Charleston, in accordance to a table contained in the Monthly Weather Review, Oct. 1910, was E. 58 mph and not from the S.E. as suggested in the above item. 40) Other maximum wind velocities associated with the storm were as follows: Wilmington, N.E. 28 mph on Oct. 18 and Hatteras, N.E. 48 mph on Oct. 20 (Monthly Weather Review, Oct. 1910). 41) Storm of Oct. 17-20, 1910. Entire Florida peninsula. Major. Damage \$ 365,000. Minor on the coast of Georgia and Carolinas, overland from Florida (Dunn and Miller, 1960). 42) Map showing a track for the storm as follows: Evening of Oct. 13, near 20.5 N., 84 W.; morning of Oct. 14, over

western Cuba; evening of Oct. 14, N.W. of Havana; morning of Oct. 15, near 25.3 N., 83 W.; evening of Oct. 15, near 26 N., 84.5 W.; morning of Oct. 16, near 25 N., 86 W.; evening of Oct. 16, near 23.5 N., 86.5 W.; morning of Oct. 17, S.W. of Havana; evening of Oct. 17, near 25.5 N., 86.5 W.; morning of Oct. 18, near 27 N., 82.5 W.; evening of Oct. 18, midway between Tampa and Jacksonville; morning of Oct. 19, near 31 N., 82 W.; evening of Oct. 19, just S. of Charleston; morning of Oct. 20, between Wilmington and Hatteras; evening of Oct. 20, near 37.5 N., 73 W. (Monthly Weather Review, Oct. 1910). Author's note: This appears to be the earliest map showing a loop track for the storm. It should be mentioned, however, that a second map published in the Monthly Weather Review, Oct. 1910, did not show a loop track but a motion first to the N., then to the S.E. and back to the N. over the southeastern Gulf of Mexico. 43) A storm was first observed near 13 N., 81 W. on Oct. 11, 1910 and lasted 13 days; it recurved near 23 N., 85 W. and it was last observed near 36 N., 58 W. (Mitchell, 1924). Author's note: The corresponding track in the above publication, which is not the one mentioned in item 30) but a second and more general one, also shows a loop centered to the N. of western Cuba. Tracks in Tannehill (1938) and in Neumann et al. (1993) were found to be similar to this second track in Mitchell (1924); however, the track in Neumann et al. (1993) was begun on Oct 9 or two days earlier than the track in Mitchell (1924).

On the basis of information contained in the above items, the author of this study introduced some modifications along the track for this storm shown in Neumann et al. (1993) as for Storm 4, 1910. The author's track was started on Oct. 11 and not on Oct. 9 because Oct. 11 was the first day a closed cyclonic circulation could be placed on the map with some degrees of confidence. Based on a ship report showing a S.S.W. f. 4 wind (item 1) and on space-time continuity as applied backwards from a 7 A.M. Oct. 12 position, the 7 A.M. Oct. 11 position on the above publication was found to be quite reasonable and, therefore, was kept unchanged and used as the beginning position along the author's track. The author's 7 A.M. positions for the period Oct. 12-17 were taken from item 30) because the author is of the opinion that they are the best ones which could be obtained by using all available data. These positions were as follows: Oct. 12, near 16.0 degrees N., 81.5 degrees W.; Oct. 13, near 19.5 degrees N., 82.5 degrees W.; Oct. 14, near 23.0 degrees N., 84.0 degrees W.; Oct. 15, near 23.7 degrees N., 85.0 degrees W.; Oct. 16, near 23.0 degrees N., 85.3 degrees W.; Oct. 17, near 23.3 degrees N., 83.7 degrees W.; the difference between these positions and the corresponding ones in Neumann et al. (1993) was found to range from about 100 miles on Oct. 14 to a few miles on Oct. 16. The 7 A.M. positions for the period Oct. 18-20 in the above publication were kept unchanged because they were found to be supported by information in items 1), 38) and 39). 7 A.M. positions for the period Oct. 21-23 in Neumann et al. (1993) were adjusted by about 70 miles to the S.E., 160 miles to the S. and 45 miles to the S.E., respectively; these adjustments were based on information in item 1) and resulted in new 7 A.M. positions as follows: Oct. 21, near 37.0 degrees N., 66.0 degrees W.; Oct. 22, near 36.0 degrees N., 61.0 degrees W.; Oct. 23, near 35.7 degrees N., 57.3 degrees W. The author's track for Storm 5, 1910 is displayed in Fig. 2.

Information in many of the 43 items above was found to support the hurricane status which Neumann et al. (1993) gave to this storm as for Storm 4, 1910 and, in fact, the occurrence of pressures below 28.50 inches and winds in the order of 110 mph and higher which was stated in some of the items clearly showed that the storm was a major hurricane in Cuba and in Florida. Storm 5, 1910 was undoubtedly a very intense hurricane and a pressure as low as 27.10 inches was reported by the steamship "Brazos" (item 32). It would be difficult to determine if this reading were reliable, but nothing wrong has been found against it and the author believes that the probable occurrence of such a low pressure value is compatible with the great violence of this storm. Therefore, if the pressure value of 27.10 inches were accepted as correct, it would make of the storm of Oct. 1910 a Category 5 hurricane on the Saffir-Simpson scale. After keeping the weather system as a tropical storm on Oct. 11, hurricane intensity was introduced along the author's track on Oct. 12 and maintained until the morning of Oct. 18 when the tropical storm status was reinstated. This new status was kept until around midnight Oct. 20-21, when the extratropical stage was introduced along the author's track in accordance with information for Oct. 21 in item 1).

Special statement.

In addition to the five storms which were fully discussed above, one possible case was found for 1910. This case is presented next.

A) Case of Sept. 13-18, 1910.

The Monthly Weather Review, Sept. 1910, stated that prior to Sept. 13, a disturbance apparently developed to the eastward of the Lesser Antilles and moved on a N.W. course. Wireless reports showed its presence a considerable distance off Hatteras on Sept. 16 and on that day advisory warnings of high winds from Hatteras to Cape Cod were issued. The disturbance moved N.N.E. a considerable distance off the middle Atlantic coast and on Sept. 18 was off the Newfoundland Banks. Strong N. and N.E. winds prevailed along the middle Atlantic and New England coasts while the storm was passing northward and the Monthly Weather Review, Sept. 1910, listed a maximum wind velocity of N.E. 43 mph at Nantucket on Sept. 17. Data plotted in Historical Weather Maps, Sept. 1910, showed some indications of a closed cyclonic circulation for first time in the morning of Sept. 13, and a low attained by winds of force 4 on the Beaufort scale could be inferred near 27 N., 72 W. in the morning of Sept. 14. By the morning of Sept. 16, a ship near 37.5 N., 70 W. reported a S.E. f. 9 wind, a second ship near 36.5 N., 66.5 W. reported a N.E. f. 8 wind, and a low was placed on the map in the vicinity of 37.5 N., 68 W. However, Hatteras reported a N.E. f. 7 wind and a ship nearby a N.E. f. 6 wind. Probably the ship near 36.5 N., 66.5 W. reported a wrong wind direction or her position was in error, and the low was likely centered in reality near 35 N., 72 W. in the morning of Sept. 16. The low at that time was apparently embedded in a frontal system which had approached the U.S. east coast from the W. on Sept. 14 and which had moved offshore; the passage of this cold front seemed to have been responsible for the maximum wind velocity of N.W. 44 mph reported at Hatteras on Sept. 14 (Monthly Weather Review, Sept. 1910). Maps for Sept. 17 and Sept. 18 showed the progress of the low as an extratropical system off the U.S. and Nova Scotia coasts, reaching the vicinity of 44 N., 62 W. on the latter day mentioned. The description above suggested that the Sept. 13-14 tropical low did not reach storm intensity until the morning of Sept. 16 when winds of force 8-9 were observed, but that at that time the system had apparently become extratropical. However, it is still possible that winds of storm intensity could have occurred prior to the time the tropical low acquired extratropical characteristics and that, if this were the case, a rather short period of tropical storm status would have existed. This possibility cannot be ruled out because tropical weather systems frequently intensify ahead of frontal troughs due to positive vorticity advection. This is why this case was kept as a possible one.

A cyclonic perturbation in the eastern Caribbean that was announced by the Cuban observatories on Sept. 12-13 and a second one that was announced by the same observatories and the Weather Bureau of Washington in the eastern and central Caribbean on Sept. 26-29 did not appear to have had a chance of attaining tropical storm intensity as they were checked against information contained on weather maps. Therefore, these two cases were not included as possible ones.